# NASA TECH BRIEF



## Brazing Process Provides High-Strength Bond Between Aluminum and Stainless Steel

**The problem:**

To devise a brazing process that will produce a ductile, high-strength, corrosion-resistant bond between stainless steel and aluminum. The bonded joint must be capable of service over the temperature range from $-320°$ to $+1000°$ F.

**The solution:**

A brazing process employing vapor-deposited titanium and an aluminum–zirconium–silicon alloy which prevent the formation of brittle intermetallic compounds between the stainless steel and aluminum.

**How it's done:**

The titanium is vapor deposited to a thickness of 0.00075 inch on the stainless steel component. A 0.040-inch-thick layer of the aluminum–zirconium–silicon alloy is then vapor deposited over the titanium barrier. The aluminum component can be readily salt-bath brazed to the vapor deposited alloy surface on the stainless steel component.

**Notes:**

1. No brittle intermetallic compounds have been found to form between the titanium and stainless steel. Although an intermetallic compound may be formed between the titanium and aluminum–zirconium–silicon alloy, it is relatively thin (less than 0.0005-inch thick) and ductile.
2. Joints formed by this process have maintained their high strength, corrosion resistance, and hermetic sealing properties, and showed no change in metallurgical structure after fatigue testing and thermal cycling.
3. This process should be useful for the brazing of components to produce assemblies combining the high strength-to-weight ratio of aluminum with the strength and corrosion resistance of stainless steel.
4. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B66-10352

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Douglas B. Nord
and Ernst G. Huschke, Jr.
of North American Aviation, Inc.
under contract to
Marshall Space Flight Center
(M-FS-803)

Category 05